

RECENT BOTANICAL COLLECTING IN THE REPUBLIC OF COLOMBIA

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There are three reasons why the flora of Colombia is of exceptional interest to students of plant distribution:

A. This country contains what might be called the "elbow" of the Andes mountains; the region where their northern extension is exchanged for a broad sweep to the east along the Caribbean Sea.

B. Soon after entering southern Colombia, the Andes divide like the tines of a fork, into three parallel branches. Since these three ranges are of very considerable height and a large part of their intervening valleys is elevated but little above sea level, there results an extreme range of climatic conditions, with a corresponding diversity of flora.

C. The country yields a number of important drugs, besides many other economic products of great interest and value.

Although the Colombian flora has been much studied, this study has been rather fragmentary than general and we have yet a great deal to learn regarding the relations between its different parts. Among the noted botanists who have studied and collected there, are Humboldt, Zea, Mutis, Triana, Karsten, and Caldas, in former times. During the eighties, Lehmann collected very extensively in the south and west. More recently, many small collections have been made, especially by American botanists, besides quite an extensive one by Mr. Herbert Smith, in the vicinity of Santa Marta.

My personal interest in the study of this flora is of a rather exceptional character, because of the great amount of work that I have done upon the flora of neighboring portions of the Andes. In 1885, I made very extensive collections from Peru southward to Chile, later traversing the entire length of the Madeira and Amazon Valley. Thereafter, I maintained a collector in Bolivia for several

years, and more recently still have been receiving collections from the Bolivian Department of Agriculture. During the nineties, I spent a season collecting in the lower Orinoco region. All of Mr. Smith's collections are represented at The New York Botanical Garden, as well as most of those of Dr. Lehmann. There was thus left an Andean region, occupying most of Colombia, the flora of which I had not seen and I have for many years desired greatly to visit it. This desire was increased by reason of my special interest in medical botany.

During the past season an opportunity was afforded for gratifying this desire, when I was asked to go to Colombia and investigate certain of its drug supplies. Although the work to be performed was of a commercial character, an opportunity was afforded for extensive botanical collecting, and I brought back with me some thirteen hundred collection numbers. This collection was principally the work of my associate, Dr. Francis W. Pennell, of the Garden staff, who accompanied me.

We left New York on June 27 and I returned on September 29, so that the entire journey occupied a period of three months and two days. Almost immediately after reaching the Port of Colombia, we boarded a river steamer and ascended to the head of steamer navigation on the Magdalena River, a journey which occupied more than a week. It thus happened that all but fifty-one days of our time were spent in sailing, when little or no collecting could be done. Quite a number of plants were collected along the river shore, when the steamer was making prolonged stops for taking on fuel, or for discharging and receiving freight. Since the vessel was close to the shore during most of its sailing, there was good opportunity, by the use of the field-glass, to ascertain the character of the neighboring vegetation. Because of my previous familiarity with tropical American plants, I was enabled to utilize this opportunity to excellent advantage.

On leaving the steamer at Girardot, we traveled by mule directly southward for seven days, getting pretty well up on the table-land adjacent to the upper Magdalena Valley. We next secured fresh mules and proceeded eastward, just crossing the ridge of the eastern range. About a week was spent in collecting about the summit of this Cordillera. We then returned north

to Girardot and took railroad train to Bogota. Circumstances interfered with collection work during my stay at this city, but Dr. Pennell, then and subsequently, did a large amount of work within a radius of two or three days' foot travel from the city. At Bogota, we separated, I returning north to visit the western mountains, while he descended to the great plains where the tributaries of the Orinoco and Negro Rivers take their rise. At Puerto Berrio I left the river and crossed the central range, where several days were spent. I had intended descending the Cauca River and possibly getting over into the valley of the Sinu, but adverse circumstances forced me to change my plan.

Inasmuch as not even that part of the collection received here has yet been studied, it will be seen that only the most general statements regarding the flora can be made. Arrangements have been made by which Dr. Pennell is to remain for several months in Colombia, visiting and collecting in districts where little botanical work has been done. It is to be expected that his collections will be very rich and that their study will add greatly to our present knowledge of the Colombian flora.

The Magdalena River flows through a broad, low, flat valley for at least half of its length. From the steamer, the mountains can be seen in the distance on both sides during most of the time. As we start our journey from the mouth of the river, we can see, near Santa Marta, the snowy summit of the highest peak in Colombia, said to have an altitude of more than twenty thousand feet. The river plain is covered with tall and luxuriant grasses, as well as sedges, and affords excellent grazing. The cattle industry here is large but is not a tithe of what is possible with an abundance of labor and economic methods. A great drawback to this industry is the extent to which young cattle are destroyed by the annual freshets, which occasionally inundate almost the entire plain. The most conspicuous features of the flora here are magnificent palms (called "palma real" by the people, and yielding very important useful products), bamboos, and pampas grass. Up to the time of this journey I had regarded the tree fern as being the most beautiful representative of the vegetable kingdom, but I am now disposed to accord this place to the bamboos of the Magdalena Valley. I can compare one of them to nothing more

fitting than a very fine ostrich plume. Their shape and their method of drooping is exactly the same, and when one finds a cluster of them, with the individual fronds arching over from the center, the effect is indescribably handsome. The pampas grasses also present a lovely appearance. The entire flower stalk may reach a height of twenty feet or more. Its lower two-thirds is very leafy. Then there is an elongated bare peduncle surmounted by a panicle several feet in length. The branches of this panicle are exceedingly long and slender, so that the slightest breeze is sufficient to blow them out in a horizontal position at one side, giving a remarkably close imitation of a flag. The color of this flag ranges from light pink to a rather dark purple. All travelers are captivated by the beauty of this grass, which grows in patches, rarely of any great extent, throughout the entire river valley. The clumps of shrubbery that are scattered over the plain belong very largely to the *Mimosa* family, especially in the lower part of the valley. As we ascend, other classes mingle with them and they become very much more abundant and larger, at length giving way to a heavy forest growth which extends quite to the river's edge. In this region, especially after we reach the hilly section, the river bank is gay with *Heliconias* of several species. The inflorescences are of a brilliant red, largely variegated with bright yellow, and to a lesser extent with blue. Those of one group are strictly erect, with slender stiletto-like branches, while those of another are pendulous, several feet in length, and of a regularly sinuous form. Throughout the greater length of the river, the trees near the water are largely *Cecropias*, of a number of species, and are of very striking appearance. Some have simple trunks, their huge digitate leaves on very long petioles, and radiating directly from the summit to form an umbrella-shaped crown, while others have a few loose and open branches. The trunks and branches of all are very light colored, appearing whitish at a distance when the sun strikes them. Most of them have hollow stems and branches which are inhabited by colonies of fiercely stinging ants. Back of these "*ambaibas*" comes a growth of *Ceibas* or silk-cotton trees, which are even more conspicuous, and are stately in their beauty. These trees have tall, straight trunks, without branches until after they have surpassed the trees around

them. Usually there is a conspicuous and graceful enlargement of the trunk at one or more points. The branches are almost horizontal and often of great length, while the crown is flattened, thus giving them a peculiar parasol-like appearance.

There are many Bignoniaceous vines, but they are scattered, this being one of the most conspicuous differences between this and the shore flora of the lower Orinoco, where there is often a continuous curtain, miles in length, of brilliantly blooming vines of this family.

As we ascend the river, the mountain ranges on both sides steadily approach the shore. Every now and then the river will take a wide sweep and impinge against the foothills of the mountains, now upon one side and now upon the other. At such places we can distinguish no characteristic difference between the composition of the flora upon the two sides. This flora is very rich and varied, so that one can scarcely attempt a description of it. Ingas, Pithecolobiums and other related plants are freely represented. There are also many Cassias. Toward the upper part of the river, Acacias become the most conspicuous trees. When we go ashore, we find *Zanthoxylums* quite abundant among the shrubbery, together with *Muntingias* and other shrubs and small trees belonging to the *Malvaceae* and *Tiliaceae*. *Clitorias* are very numerous and very handsome. Rubiaceous shrubs, herbs, and small trees are exceedingly abundant, as are herbaceous *Euphorbias* and shrubby *Crotons*. Shrubby and arborescent *Solanums* are in bewildering variety. Large cactuses are seen occasionally in the lower river valley and become more and more abundant toward the highlands. They are, however, never in great variety and never so abundant as to be a very conspicuous feature of the landscape. *Crotons* and *Solanums* also increase in variety and abundance as we go southward, up the river.

In the vicinity of Girardot, the land has been mostly cleared of its forests, and we have an excellent opportunity to study and collect the flora of these open hills and fields, exposed to the baking of an extremely hot sun and generally known as "*pajinales*." Malvaceous and Tiliaceous shrubs, twining herbaceous Leguminosae, *Zanthoxylums*, *Borrerias* and related Rubiaceae, and especially *Crotons* and *Solanums* cover these grounds. There are very many

sedges and in the more barren places, large areas clothed with *Andropogons*. Beautiful aquatics are found wherever the soil is suitable.

Leaving the steamer and traveling by mule, we rapidly climb to the dry table-lands near the base of the mountains and at places are obliged to cross projecting mountain spurs. In the lower places, we are impressed by the beauty of hedges of *mata-raton*, a small tree related to *Robinia* and handsomely covered with rose-purple panicles of flowers. Upon this part of the journey, we find great numbers of shrubby and herbaceous vines belonging to the milkweed and dogbane families. We crossed during the height of the dry season so that there was almost no collecting to be done, but it was quite evident that at certain seasons the flora of this mesa must be exceedingly rich and wonderfully beautiful. Among the grasses, *Boutelouas* are the most conspicuous. Water was scarce at this season, so that cattle and other domestic animals were forced to confine themselves to the narrow strips along the rivers and quebradas. As a result, these places were very much over-run and their flora largely destroyed. The shrubby and arborescent vegetation of these ravines and smaller river valleys consists largely of *Acacias*, among which are many cactuses, so that travel among them is very difficult. Large shrubby and arborescent *Crotons* and *Solanums* here continue to maintain a prominent position.

At length we are so fortunate as to be able to leave the prostrating heat, filthy odors, and mosquito- and malaria-infested valleys of the mesa, and to plunge among the ravines and canyons of the eastern mountain range. No sooner does one enter one of these valleys than he finds a rich forest growth, maintained at all seasons by the streams which flow upon or close to the surface of the earth. The composition of this flora bears a general resemblance to that of the remainder of the Andes. Its chief interest will center in the mixture of genera and species respectively peculiar to the south and east, and cannot be discussed until our collections shall have been studied. *Crotons* maintain the supremacy at the lower altitudes, while *Solanums* persist for a great distance farther up. We see many large areas on the open hillsides that are covered with a tall and stout *Andropogon* of a deep rusty-red

color. Prominent and beautiful are one or more species of *Securidaca*, Polygalaceous woody vines which drape many trees with an unbroken canopy of pink or rose purple. Orchids and bromeliads are increasingly abundant as we approach the summit and many of them are very beautiful. No sooner do we begin to approach the summit than we encounter blackberry thickets, and these become more than conspicuous to the very summit. Of these there are many species and very possibly many hybrids, so that it is difficult for one to keep track of his collections. The canes are very tall and heavy, and in many cases assume a half-climbing condition among the trees. Their panicles of fruit are sometimes a foot in length and almost as broad at the base, and very dense, so that they droop heavily over the shrubbery. The individual fruits are sometimes more than an inch in length and breadth and their drupelets of surprising size. These larger varieties are scarcely edible, being sour and somewhat bitter, and reputed as poisonous. Others are of delicious flavor and are largely marketed. There is a strawberry with very small, extremely deeply pitted and rather poorly flavored fruit, which is also considerably marketed. The false strawberry forms large patches, which are brilliantly and temptingly fruited. Many of the timber woods are of great utility and value, especially a species of black walnut which is largely employed in cabinet work. Among the more beautiful flowers of the summit are Gesneriaceae, in great variety and of lovely shades, many terrestrial and arborescent orchids, several species of Fuchsias of exquisite beauty, Begonias and *Oxalis* of numerous species and several Fagelias. The handsomest flower here, and one of the handsomest that I have ever encountered, is a species of *Bomarea*. It climbs to a height of several yards, its flowering tops and branches then drooping deeply over the banks of verdure that line the trail. The flower clusters are often large enough to fill a peck measure and are of a rich maroon color, sometimes almost as deep as chocolate, at others of a rich crimson. The bell-shaped flowers are richly mottled in the throat and the effect is too handsome for description. This species has large tuberous roots which can be used as food. Dahlias are quite abundant and we are astonished to find one species forming clumps fifteen feet or more in height and more like small trees than herbs.

We are more than astonished to see *Physalis peruviana*, which with us is but a few inches in height, there reaching a height of seven feet and spreading equally in breadth, and capable of yielding a half bushel or more of fruit. Melastomaceae are quite varied and abundant, and rather beautiful, but cannot compare in this respect with the representatives of the family in the more southern countries. There are one or two species of *Befaria*, having the same habit of growth as our Azaleas and much resembling them when in full bloom, which are exceptionally beautiful features of the landscape, their color shading variously through pink, purple, lavender, and violet. Ferns are in great variety but not so handsome as in other parts of the Andes which I have visited. To this statement, we must except the tree ferns, which are abundant and lovely.

It remains to be stated that Vacciniaceous plants are abundant and diversified and many of them decidedly showy. For the most part, they bear scarlet or cherry-red tubular flowers in large and dense clusters, at the ends of long pendent branches. A number of them produce delicious edible fruit, one closely filling the place of our cranberry, but sweet and of better flavor. Ericaceae are also quite numerous, especially in swampy regions at the summit, but not nearly so conspicuous or beautiful as those of the family last considered.

There is one important feature of the climate here which it seemed to me might well be taken into consideration by those who endeavor to grow in temperate houses the plants of such so-called temperate regions as those under consideration. A "temperate" climate at these high altitudes is fundamentally different from a temperate climate at a lower altitude and farther north, even though the average temperature may be the same in both cases. In such elevated regions, among tropical mountains, the temperature regularly falls at night, even in the midst of the summer season, to a much lower point than is experienced in temperate latitudes. On the other hand, during the sunny portions of the day, we find it extremely hot, so that the variation between mid-day and midnight is extreme. It is not conceivable that plants which have been developed and which have lived under such conditions should not have acquired a constitution which requires

such sudden and wide changes for their life and health. It occurred to me while experiencing these conditions that some instructive experimental work might be done by removing those plants to conservatories and subjecting them to various conditions of temperature, among others the changeable ones under which they have been accustomed to grow, and to compare the results upon their life history.